PATENT ABSTRACTS OF JAPAN
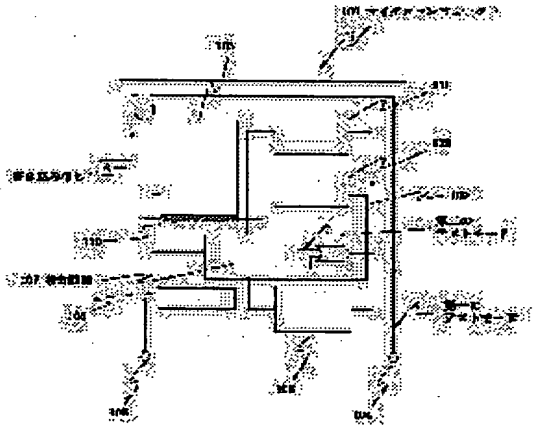
(54) MICROCOMPUTER AND ITS INSPECTING METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To efficiently and simply execute inspection while assuring security by previously storing identification data characteristic to each user inside and inspecting only when data coinciding with the identification data are detected.

SOLUTION: An EEPROM 103 is incorporated in a microcomputer 100 and at the time of manufacturing, identification data of a number, etc., set to each user is written in an area 110. Data are inputted from a second external input terminal 105 and stored in a data inputting circuit 106. Only when a detection circuit 107 detects the coincidence of the input data and an identification code, inspection can be executed. When the manufacturer executes inspection at the time of shipping, all of the incorporated ROMs and peripheral devices are inspected. However, in this test mode, it is desirable to restrict inspecting objects from the viewpoint of the improvement of security.

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CLAIMS

[Claim(s)]
[Claim 1] The microcomputer characterized by building in the record medium which recorded the program for shifting to the static test mode which makes it possible to store the discernment data of a proper in each user inside beforehand, and to inspect by operating ROM and the peripheral device which are built in only when said discernment data and data in agreement are detected according to an individual.
[Claim 2] The microcomputer according to claim 1 characterized by building in the record medium which recorded the program for shifting to the static test mode which makes it possible to inspect only about a part among ROM built in and a peripheral device.
[Claim 3] (1) The memory by which the discernment data of a proper were written in each user, and the input means for inputting data from (2) exteriors, (3) The detecting circuit which compares said discernment data with the data inputted by said input means is built in. And said discernment data, The microcomputer according to claim 1 or 2 characterized by building in the record medium which recorded the program for shifting to a static test mode only when said detecting circuit compares the data inputted by said input means and both data are in agreement.
[Claim 4] the memory by which the discernment data of a proper were written in (1) each user on the single semi-conductor substrate, the input means for inputting data from (2) exteriors, and (3) — the microcomputer according to claim 3 characterized by coming to arrange the detecting circuit which compares said discernment data with the data inputted by said input means.
[Claim 5] (1) The first memory by which the discernment data of a proper were written in each user, and the second memory in which (2) rewritings are possible, (3) The detecting circuit which compares said lead data from the second memory with the discernment data written in said first memory, (4) Data which contained the input means for writing data in said second memory from the exterior, and were written in the second memory by said input means, The microcomputer according to claim 1 or 2 characterized by building in the record medium which recorded the program for shifting to a static test mode only when said detecting circuit compares the discernment data stored in said first memory and both data are in agreement.
[Claim 6] The first memory by which the discernment data of a proper were written in (1) each user on the single semi-conductor substrate, (2) — the second rewritable memory and (3) — with the detecting circuit which compares said lead data from the second memory with the discernment data written in said first memory (4) Microcomputer according to claim 5 characterized by coming to arrange the input means for writing data in said second memory from the exterior.
[Claim 7] The inspection approach of the microcomputer characterized by inputting the discernment data of a proper into each user beforehand inside the microcomputer, and inspecting by shifting to the static test mode which can be inspected by operating ROM and the peripheral device which are built in only when said discernment data and data in agreement are detected according to an individual.
[Claim 8] The inspection approach of the microcomputer according to claim 7 characterized by inspecting only about a part among ROM built in and a peripheral device by shifting to the static test mode which makes it possible to inspect.

[Claim 9] (1) The memory by which the discernment data of a proper were written in each user, and the input means for inputting data from (2) exteriors, (3) The detecting circuit which compares said discernment data with the data inputted by said input means is established in the interior of a microcomputer. The inspection approach of the microcomputer according to claim 7 or 8 characterized by inspecting by shifting to a static test mode only when said detecting circuit compares said discernment data and the data inputted by said input means and both data are in agreement.
[Claim 10] (1) The first memory by which the discernment data of a proper were written in each user, and the second memory in which (2) rewritings are possible, (3) The detecting circuit which compares said lead data from the second memory with the discernment data written in said first memory, (4) Data which formed the input means for writing data in said second memory from the exterior in the interior of a microcomputer, and were written in the second memory by said input means, The inspection approach of the microcomputer according to claim 7 or 8 characterized by inspecting by shifting to a static test mode only when said detecting circuit compares the discernment data stored in said first memory and both data are in agreement.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the structure of the microcomputer for performing easily the method of inspecting the engine performance of a microcomputer, and such an approach.
[0002]
[Description of the Prior Art] Conventionally, on the occasion of shipment of the microcomputer which contains memory, when a manufacturer conducts performance verification about all the built-in devices, the dependability of a product has been raised. And as for the function, i.e., a static test mode function, to conduct such inspection, it was common that a user prevented from using it at the time of shipment from the object which prevents the poor program by the program stored in Built-in ROM, unjust runoff of data and an alteration, or accidental accident.
[0003] However, when the activity application of the microcomputer by the user is complicated, the microcomputer to be used produces nonconformity and a manufacturer side is pressed for a response as the structure of a microcomputer is complicated and a function comes to be various, huge time amount has been needed for the rendering of nonconformity.
[0004] Moreover, it has been necessary to exhibit a static test mode, the demand of wanting to conduct inspection at the time of acceptance and inspection at the time of nonconformity generating in person to some extent increasing also from the user side, and securing the safety of a program and data from such a situation.

[0005] As an approach of shipping a product, with a static test mode function held, the flag of static test mode authorization / disapproval is formed in the memory built in for example, in a Provisional-Publication-No. No. 251841 [62 to] official report, and when a permission is granted, making a static test mode function available is indicated. However, in this approach, since it considers as the condition of static test mode authorization at the time of the front [shipment] inspection by the manufacturer and set to the disapproval side in principle at the time of shipment, although it shipped in the condition [having held the static test mode function], the general user was actually unable to use a static test mode function.

[0006] Therefore, one [opening altogether the static test mode which performs at the time of the inspection by the side of ** manufacturer who stores the program to which a user can inspect simple and inspects by operating all ROMs built in ** product which inspects using this program and field to a user to one field of one of which ** built-in does when a user is going to inspect a microcomputer of ROMs] of approaches will be used.

[0007]
[Problem(s) to be Solved by the Invention] However, there were the following troubles in the approach of the above-mentioned ** − **. That is, in **, although a new program was stored in one field of ROM, it was difficult to secure field sufficient in order to enable complicated inspection, and since time amount huge in order to inspect in ** was taken, the problem was in the point that effectiveness is dramatically bad. Moreover, if there are circumstances where it came considering the static test mode as secret, at all in order not to make the program or data in ROM decode easily as mentioned above, it is clear that the approach of static test mode disclosure of ** is not desirable.

[0008] Then, the technical problem of this invention is offering the microcomputer of an approach with a user able to conduct the inspection efficiently and simple moreover, and the structure which enables such inspection, securing the security of a microcomputer.

[0009]
[Means for Solving the Problem] The microcomputer of this invention for solving the above-mentioned technical problem is characterized by to build in the record medium which recorded the program for shifting to the static test mode which makes it possible to store the discernment data of a proper in each user inside beforehand, and to inspect by operating ROM and the peripheral device which are built in only when said discernment data and data in agreement are detected according to an individual. It enables a user to inspect efficiently by the common static test mode a manufacturer side by this. Moreover, the security to a program, runoff of data, etc. improves by giving identification code only to the limited user.

[0010] Moreover, the microcomputer of this invention is characterized by building in the record medium which recorded the program for shifting to the static test mode which makes it possible to inspect only about a part among ROM built in and a peripheral device. Security improves further by this exhibiting only the part which a user needs among static test modes.

[0011] Moreover, the memory by which, as for the microcomputer of this invention, the discernment data of a proper were written in (1) each user, The detecting circuit which compares said discernment data with the data inputted by said input means is built in. (2) — the input means for inputting data from the exterior, and (3) — with said discernment data Only when said detecting circuit compares the data inputted by said input means and both data are in agreement, it is characterized by building in the record medium which recorded the program for shifting to a static test mode. It enables a user to inspect efficiently by the common static test mode a manufacturer side by this. Moreover, the security to a program, runoff of data, etc. improves by giving identification code only to the limited user. Moreover, security improves further by exhibiting only the part which a user needs among static test modes.

[0012] an input means for the microcomputer of this invention to input data as the memory by which the discernment data of a proper were written in (1) each user from (2) exteriors on a single semi-conductor substrate and (3) — it is characterized by coming to arrange the detecting circuit which

compares said discernment data with the data inputted by said input means. [moreover,] Thereby, the configuration of a microcomputer can be used as a compact.

[0013] Moreover, the first memory by which, as for the microcomputer of this invention, the discernment data of a proper were written in (1) each user, (2) — the second rewritable memory and (3) — with the detecting circuit which compares said lead data from the second memory with the discernment data written in said first memory (4) Data which contained the input means for writing data in said second memory from the exterior, and were written in the second memory by said input means, Only when said detecting circuit compares the discernment data stored in said first memory and both data are in agreement, it is characterized by building in the record medium which recorded the program for shifting to a static test mode. It enables a user to inspect efficiently by the common static test mode a manufacturer side by this. Moreover, the security to a program, runoff of data, etc. improves by giving identification code only to the limited user. Moreover, security improves further by exhibiting only the part which a user needs among static test modes.

[0014] Moreover, the first memory by which, as for the microcomputer of this invention, the discernment data of a proper were written in (1) each user on the single semi-conductor substrate, (2) It is characterized by coming to arrange the input means for writing data in said second memory from the second rewritable memory, and the detecting circuit which compares said lead data from the second memory with the discernment data written in said first memory and (3) (4) exterior. Thereby, the configuration of a microcomputer can be used as a compact.

[0015] Moreover, the inspection approach of the microcomputer of this invention is characterized by inputting the discernment data of a proper into each user beforehand inside the microcomputer, and inspecting by shifting to the static test mode which can be inspected by operating ROM and the peripheral device which are built in according to an individual only when said discernment data and data in agreement are detected. It enables a user to inspect efficiently by the common static test mode a manufacturer side by this. Moreover, the security to a program, runoff of data, etc. improves by giving identification code only to the limited user.

[0016] Moreover, the inspection approach of the microcomputer of this invention is characterized by inspecting by shifting to the static test mode which makes it possible to inspect only about a part among ROM built in and a peripheral device. Security improves further by this exhibiting only the part which a user needs among static test modes.

[0017] Moreover, the inspection approach of the microcomputer of this invention (1) The memory by which the discernment data of a proper were written in each user, and the input means for inputting data from (2) exteriors, (3) The detecting circuit which compares said discernment data with the data inputted by said input means is established in the interior of a microcomputer. Only when said detecting circuit compares said discernment data and the data inputted by said input means and both data are in agreement, it is characterized by inspecting by shifting to a static test mode. It enables a user to inspect efficiently by the common static test mode a manufacturer side by this. Moreover, the security to a program, runoff of data, etc. improves by giving identification code only to the limited user. Moreover, security improves further by exhibiting only the part which a user needs among static test modes.

[0018] Moreover, the inspection approach of the microcomputer of this invention (1) The first memory by which the discernment data of a proper were written in each user, and the second memory in which (2) rewritings are possible, (3) The detecting circuit which compares said lead data from the second memory with the discernment data written in said first memory, (4) Data which formed the input means for writing data in said second memory from the exterior in the interior of a microcomputer, and were written in the second memory by said input means, Only when said detecting circuit compares the discernment data stored in said first memory and both data are in agreement, it is characterized by inspecting by shifting to a static test mode. It enables a user to inspect efficiently by the common static test mode a manufacturer side by this. Moreover, the security to a program, runoff of data, etc.

improves by giving identification code only to the limited user. Moreover, security improves further by exhibiting only the part which a user needs among static test modes.

[0019] In this invention, although inspection which a manufacturer conducts at the time of shipment is exhibited to a user, in such a case, the cure is taken from two points to the danger of the program which was a with thing conventionally, and runoff of data.

[0020] Security is secured by making inspection possible only within the case where the discernment data of the proper which is beforehand set up in the first place to each user at the time of shipment, and is beforehand stored in it in the microcomputer, and the data which the user inputted from the outside are in agreement. In the manufacture phase of a microcomputer, discernment data are written in the built-in memory, and they are set up so that it cannot rewrite on the occasion of shipment after that. The data which a user inputs from the exterior are compared discernment data and directly in a detecting circuit at the time of the input. Or as the second memory made into the condition that after shipment is rewritable was made to build in a microcomputer and the user could rewrite data to it with the input means, after once storing data in it here, it can compare with discernment data.

[0021] Identification codes, such as a number, are given to each user, and it stores in the interior of a microcomputer beforehand, and when the data inputted from the outside and said discernment data are in agreement, the technique itself of which read-out of the program and data in Built-in ROM is made possible is well-known by for example, a publication-number No. 138635 [two to] official report etc. However, this invention does not make possible read-out of the program only stored in Built-in ROM or data, but actuation is made possible about other built-in peripheral-device each, and it differs in that this inspects.

[0022] If it does in this way, a user can conduct common inspection easily a manufacturer side. Moreover, it is not necessary to newly set up a complicated program for a user to inspect, and when discernment data and data in agreement are detected, the point to make the easy program for shifting to a static test mode building is excellent.

[0023] Moreover, although it is generally necessary to inspect the actuation about all built-in devices in the inspection by the side of a manufacturer and the static test mode is set up such, in case a user inspects a part to a user in the part which can be inspected rather, limiting to an indispensable part is possible. If it does in this way, inspection of a part not to exhibit to the exterior of a user's ROM program data etc. can be made impossible, and they can raise security further.

[0024]

[Embodiment of the Invention] (Operation gestalt 1) An example of the configuration this abbreviation for a microcomputer is shown in drawing 1 as an operation gestalt of this invention, and it explains below. In the microcomputer 100, ROM101 which stored a program and data is built in with other functional block 102. Moreover, EEPROM103 is built in and discernment data, such as a number set up for every user, are written in a field 110 at the time of manufacture. At this time, by considering as the write-in signal of a discernment data write-in field, in the first static test mode, discernment data rewriting is possible, and rewriting of the AND signal of the write-in signal of said EEPROM103 whole and the signal in the static test mode by the side of a manufacturer (the following first static test mode, and description) can be made impossible after shipment.

[0025] Moreover, the second external-input terminal 105 for using it, in case the first external input terminal 104 and user for using it in case a manufacturer side inspects inspect is formed, and the second external input terminal 105 is connected to the data input circuit 106 for storing the inputted data temporarily. The input terminal input for the number of bits of data required also of the serial data based on one terminal is sufficient as the second input terminal 106.

[0026] Moreover, it has the detecting circuit 107 which compares the discernment data stored in EEPROM103 with the data kept in the data input circuit 106, and judges whether it is in agreement. Moreover, in CPU108, the program for shifting to the static test mode by the side of a user who describes below (the second static test mode and description) is stored.

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[0027] Next, a process until it shifts to the second static test mode is explained. Data are inputted from the second external input terminal 105, and it accumulates in the data input circuit 106. The data from the second external input terminal 105 are always read at the time of external reset activation initiation of a microcomputer 100, and a reading activity is stopped by predetermined time. A reading terminate signal is taken out from the data input circuit 106, reset of a microcomputer 100 is completed, and it will be in the condition that a microcomputer 100 can operate.

[0028] When judged with the second input data and discernment data from the external input terminal 105 not being in agreement by the detecting circuit 107, a computer is operated in the usual mode. And it becomes possible to inspect, only when the second input data and identification code from the external input terminal 105 are in agreement.

[0029] In addition, in case a manufacturer side conducts inspection at the time of shipment, it cannot be based on the result of the second external input terminal 105, but a microcomputer can be performed. In this first static test mode, it is common to inspect about all the ROMs and peripheral devices that are built in in order to raise the dependability of a product. However, it is desirable for it not to be necessary to inspect these [all] in the second static test mode and, and to restrict a subject of examination from a viewpoint of improvement in security.

[0030] (Operation gestalt 2) As another operation gestalt of this invention, an example of the configuration this abbreviation for a microcomputer is shown in drawing 2 , and it explains below. Here, identification code is beforehand written in the field 210 of ROM101, and a user writes in the field 220 which had the same data as discernment data specified by EEPROM103 if needed. A detecting circuit 107 compares discernment data and the data of a field 210 at the time of starting of the microcomputer 100 by reset, and it becomes possible to inspect, only when in agreement. If a subject of examination is limited like the first operation gestalt also in this case, security improves and is much more desirable. .

[0031] In addition, if it is the combination as which the data for comparing with discernment data and this are inputted into a detecting circuit, it will not be limited to the first operation gestalt (it is a direct data entry from storing and the exterior to EEPROM about discernment data), and the second operation gestalt (comparison data are stored for discernment data in ROM which can be stored and rewritten to EEPROM). For example, the memory which stores discernment data does not necessarily need to be EEPROM, and the usual ROM is sufficient as it. Moreover, the memory which stores the data to compare is good also as not ROM but RAM.

[0028]

[Effect of the Invention] As mentioned above, according to this invention, a user becomes possible [inspecting a microcomputer easily and efficiently]. in addition — and the security of the built-in program or data is secured.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is an equipment configuration schematic diagram in the operation gestalt of this invention first.

[Drawing 2] It is an equipment configuration schematic diagram in the operation gestalt of this invention second.

[Description of Notations]

100 Microcomputer

101 ROM

102 Other Functional Block

103 EEPROM

104 First External Input Terminal

105 Second External Input Terminal

106 Data Input Circuit

107 Detecting Circuit

108 CPU

109 Data Bus

110, 210, 220 Data write-in field

[Translation done.]